User Commanding - Phase 1 Thread

Assessment

April 25, 1997

Version 1.01

1.1 User Commanding Phase 1 Thread Overview.

The User Commanding Thread for the Redstone delivery provides initial capability for demonstrating basic User Commanding capability in two environments:

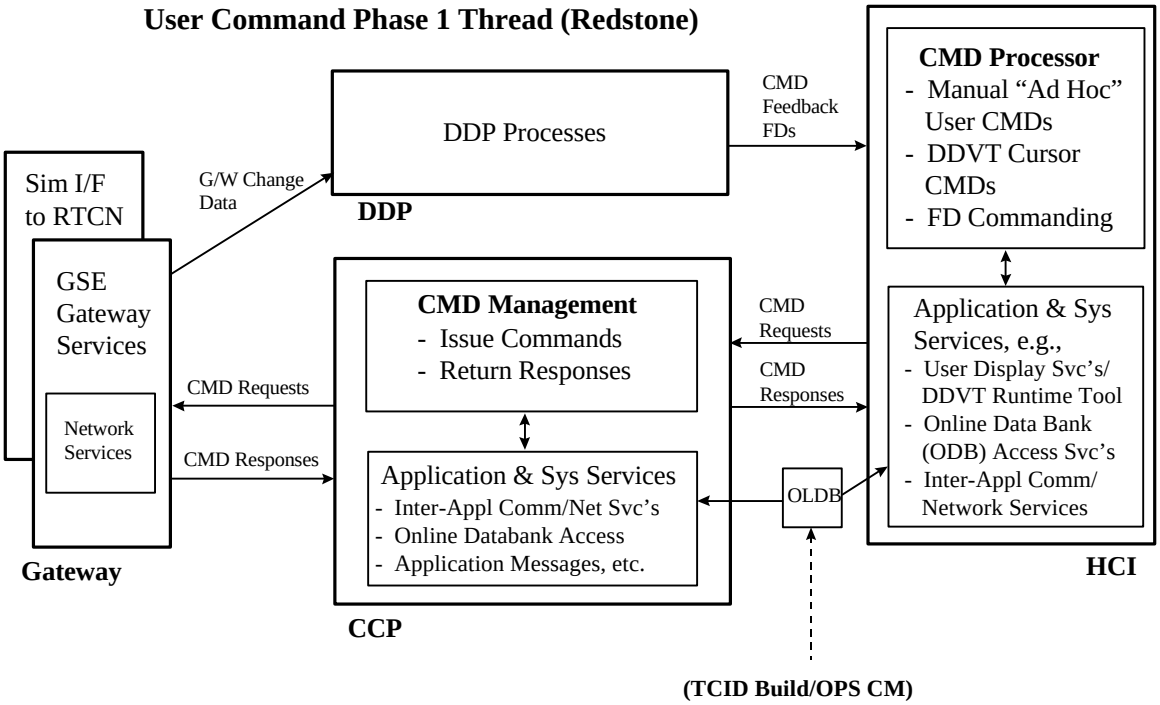
- End-to-End demonstration (HCI-to-HIM) of GSE Analog and Discrete commanding
- Demonstration of user display capability to control GSE Analog and Discrete Stimulus in the Application Debug Configuration Thread.

Additionally, the User Commanding capability will support the application debug development and the RTCN Simulation Thread.

1.2 User Commanding Phase 1 Concept

GSE HIM Command Requests are generated via the HCI Command Processor prototype Cursor Command and Manual Command display interfaces. The resultant FD Command Requests are routed to the Command Management Service in the CCP and then forwarded to the GSE Gateway for authentication and transmission to the HIM. Command Responses are returned from the GSE Gateway to the CCP Command Management Services and then back to the originating HCI. The GSE Gateway also provides Gateway Change Data, including Command Feedback FDs, to the DDP Processes which in turn makes the Measurement FDs available for other processors, including the HCI platform. Additionally, the prototype Command displays will execute in the application debug environment.

The User Commanding Phase 1 Thread requires support from most major CLCS Systems and Subsystems. The following concept diagram illustrates major components participating in the User Commanding Phase 1 Thread.



1.3 User Commanding Phase 1 Specification

The User Commanding Phase 1 Thread will provide the following capabilities and tasks per the Redstone Delivery Plan Statement of Work (SOW):

- Provide the capability to send command stimulus from an HCI display.
- Develop user interface methods for cursor commands and upgrades to selected display tool to provide cursor stimulus.
- Develop an initial user interface for manual User Commands.
- Provide capability to send commands from the CCP.
- Provide the capability for User Commanding function to be utilized in both Operational and Application environments.
- Provide initial System Application and Application Services:
    - In the CCP, receive a HCI request, format it and forward it to a Gateway.
    - In the CCP, receive a Gateway response, format it and forward it to a HCI
    - In the Gateway, send Feedback FDs in Data Change packets to the Data Distribution Function.
- Provide a user display capability to control GSE Analog and Discrete Stimulus.
- Develop Packet formats and content.
- Provide a demonstration of the above user display in the Application Debug Configuration.
- Provide a demonstration of end-to-end (HCI-to-HIM) GSE Analog and Discrete commanding.
- Provide the capability for two-step command confirmation on the HCI platform (added to SOW at DP1 Internal Review).

1.4 User Commanding Phase 1 Assessment Summary

Number	CSCI/HWCI Name	Labor Months (LM)
1	Command Processor CSCI	12 LM
2	User Application Processing CSCI (Command Management CSC)	9 LM
3	GSE Gateway Services CSCI	GSE Support Thread
4	Applications Services CSCI	24 LM
5	System Services CSCI	12 LM
6	TCID Build & Control CSCI	Test Build, Load & Activation Thread
7	System Control CSCI	System Build & Load Thread
8	System Viewers CSCI	User Display Monitor and Plotting Thread

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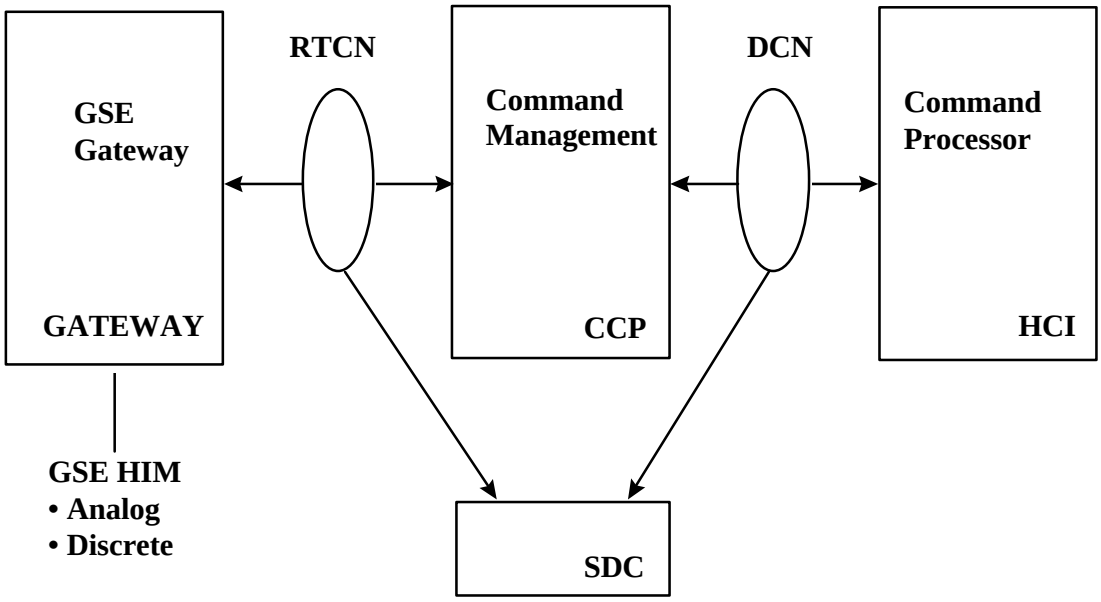
1.5 User Commanding Phase 1 Hardware Diagram



(Recording)

1.6 User Commanding Phase 1 Deliverables

- Source and executable software will be provided for the following:
    - GSE Gateway capability to process commands and return command responses and to provide Feedback FDs in Data Change packets - see GSE Support Phase 1 Thread.
    - Prototype Manual and Cursor Control HCI displays for GSE Commanding.
    - Prototype HCI capability for issuing command requests to CCP:
        - Initial capability to generate and send/route HCI-initiated command requests to CCP.
        - Initial capability to return CCP responses to HCI.
    - Initial CCP capability for issuing GSE Gateway commands:
        - Initial capability to receive and authenticate/validate HCI-initiated command requests.
        - Initial capability to send/route CCP-issued commands to Gateway.
        - Initial capability to receive Gateway responses in the CCP and to return Gateway and/or CCP originated responses to the HCI.
- CCP-Gateway Interface Packet format and content definitions will be provided in the CCP-Gateway IDD.
- Preliminary Command Processor CSCI and Command Management CSC design documentation, including Command HCI-CCP Interface Packet format and content definitions and API definition, will be provided.
- User evaluation report for HCI prototyping effort

1.7 User Commanding Phase 1 Schedule

See attached.

1.8 User Commanding Phase 1 Simulation Requirements

The User Commanding Phase 1 Thread will utilize the existing LPS Simulation System with the math models for HMF and OPF GSE. The GSE Gateway will be connected to the VSIs in the LCC via the PCC RCVS. All simulations will be conducted in the real-time mode.

In addition to model support, mini-HIM will be used to verify command processing interfaces. The mini-HIM will be available in the SDEs for testing.

1.9 User Commanding Phase 1 System Test Requirements

End-to-End integration testing of the CSCIs in the User Commanding Thread will be performed prior to delivery to System Test:

- Configuration initialization via OPS CM
- HCI Command Processor-CCP Command Management Command Requests and Responses
- CCP Command Management-Gateway Command Requests and Responses
- System Message Writer messages related to commanding
- SDC recording of Command messages

System Test Plan and Procedures will be determined by the System Test Organization.

1.10 User Commanding Phase 1 Training Requirements

User Commanding thread personnel require training on the project selected display tool (SL), development tools, and Configuration Management tool.

User training to be supplied by the User Commanding thread team will be limited to informal training for Command Thread demonstration and prototype HCI assessments purposes only.

1.11 User Commanding Phase 1 Facilities Requirements

The User Commanding Thread requires the following development resources at KSC:

HCI Platform
CCP Platform
Gateway Platform
(DDP Platform)

The full GSE Support Thread SDE/IDE platform and network configuration, including mini-HIM or simulation resources, is required for User Commanding Phase 1 Thread Operational demonstration. The Application Debug Thread configuration is required for demonstrating User Commanding in that environment.

1.12 User Commanding Phase 1 Procurement

None

1.13 User Commanding Phase 1 Dependencies

Number	CSCI/HWCI Name	CSCI/HWCI
1	Command Processor CSCI	CSCI
2	User Application Processing CSCI: • Command Management CSC	CSCI
3	GSE Gateway Services CSCI	CSCI
4	Applications Services CSCI: • User Display Services • Online Data Bank Access • Inter-Application Communications • Application Messaging (System Message Writer Interface) • Application Data Logging (Data Logging/Delog Interface)	CSCI
5	System Services CSCI: • Network Services • System Message Writer • Data Logging/Delog	CSCI
6	TCID Build & Control CSCI	CSCI
7	System Control CSCI: • OPS CM (Software & Tables Load and Activation)	CSCI
8	System Viewers CSCI: • System Messages Viewer	CSCI

1.14 User Commanding Action Items/Resolution

- Selection of specific GSE analog and discrete command stimuli for demonstration is required
- A “uniform” messaging service should be available for both HCI-CCP and CCP-Gateway Command Inter-Application Communications

2. CI Assessments

2.1 Command Processor CSCI Assessment

The following Command Processor CSCI functions will be provided in support of the User Commanding thread:

Command Processor Work Required

- Provide a user display capability to control GSE Analog and Discrete Stimulus
- Provide the capability of sending command stimulus from an HCI display.
- Develop user interface methods for cursor commands and upgrades to selected display tool to provide cursor stimulus.
    - The DDVT COTS Tool selected for Redstone delivery will be enhanced, via User Display Services, to generate links for each analog or discrete stimuli element where command-specific directive definition code can be created.
- Develop an initial user interface for manual User Commands.
    - One Manual entry HCI display will be created for keyboard text entry of analog or discrete GSE commands.
- Provide capability to send commands from the HCI Display to the CCP.
    - Command API Services will be defined to support sending directives from the HCI display to Application Services Inter-Application Communications/Network Services.
- Develop HCI-CCP Command Packet formats and content.
    - Packets will be designed to exchange HCI generated Command Requests to the CCP for Manual and Cursor Control initiated Commands.
    - Packets will be designed to return Gateway or CCP generated Command Responses to the HCI.
- Provide the capability for the User Commanding function to be utilized in both Operational and Application environments.
    - The HCI displays will be able to operate in standard operational mode (sending Command Requests to the CCP/GSE Gateway and receiving Command Responses).
    - The HCI displays will operate for application development when loaded in debug mode (sending/receiving Command Requests and Responses to and from the CCP Command Management function and external/internal modeling of the Gateway in a standalone configuration within the Application Debug Configuration Thread).

CSCI Assessment

Function Name	CSCI Labor (EP)	% of CSCI	Function Labor Months
DDVT/Cursor Commanding CSC			4 LM
Manual Commanding CSC			4 LM
FD Commanding CSC			4 LM

Lines of Code

2000 SLOC.

Documentation

IDD/API Definitions (HCI-CCP Command Packets), Requirements/Design Documentation

Assumptions

- HCI-initiated Command Requests and returned Responses are individual user "transactions", e.g., no "display sharing" of individual transaction information with other HCI users is required.

Open Issues

None

2.2 User Application Processing CSCI Assessment

The following User Application Processing CSCI functions will be provided in support of the User Commanding thread:

CCP Command Management CSC Work Required

- Provide initial System Application Services:
    - In the CCP, receive a HCI request, format it and forward it to the GSE Gateway.
        - Receive a structured HCI Command Request via Inter-Application Communications/ Network Services.
        - Process structured HCI Command Request in the Command Manager to create a CCP Command Request.
        - Queue CCP Command Request for matching to Gateway Command Response.
        - Route CCP Command Request to GSE Gateway via Inter-Application Communications/Network Services.
        - Structure and send CCP Command Responses to HCI via Command API.
    - In the CCP, receive a Gateway response, format it and forward it to the HCI.
        - Receive GW command response via Inter-Application Communications.
        - Match Response to Request from Queue.
        - Structure and send CCP Command Response to HCI.
- Develop Command Packet formats and content:
    - Packets will be designed to exchange Command Requests from the CCP to the GSE Gateway.
    - Packets will be designed to receive Command Responses from the Gateway
- Provide the capability for the User Commanding function to be utilized in both Operational and Application environments.
    - The CCP Command Management service will be able to operate in standard operational mode (sending Command Requests from the HCI to GSE Gateway).
    - The CCP Command Management service will operate for application development when loaded in debug mode (receiving/responding to Command Requests from the HCI function and inter-acting with external/internal modeling of the Gateway in a standalone configuration within the Application Debug Configuration Thread).

CSCI Assessment

Function Name	CSCI Labor (EP)	% of CSCI	Function Labor Months
CCP Command Management CSC			9 LM

Lines of Code

1500 SLOC.

Documentation

IDD/API Definitions (HCI-CCP Command Packets), Requirements/Design Documentation

Assumptions

None

Open Issues

None

2.3 GSE Gateway Services CSCI Assessment

GSE Gateway Work Required

- The GSE Gateway will provide the capability:
  - to accept CCP Command Requests.
  - to authenticate the requests.
  - to transmit valid Command Requests to the HIM.
  - to return Gateway Command Responses to the originating CCP.
- In the Gateway. Feedback FDs in Data Change packets will be provided (for support by the Data Distribution Processor Thread)
- Additionally, GSE Gateway CSCI personnel will participate with Command CSCI personnel in the definition of CCP-Gateway Command request and Command response packets definition

CSCI Assessment

Detailed requirements and CSCI assessment for the GSE Gateway support for the User Commanding Phase 1 Thread is provided in the Phase 1 GSE Support Thread.

2.4 Application Services CSCI Assessment

Applications Services will provide the interface services (APIs) for supporting User Commanding interaction with the underlying System Services and Runtime Tools, such as the Dynamic Data Visualization Tool (DDVT).

User Display Services Work Required

User Display Services/DDVT (runtime) will support CMD HCI prototyping for Manual User and Cursor Command displays with the following capabilities:

- Provide the capability at display initialization to retrieve and retain all Command FD information associated with a DDVT display
- Provide the capability for DDVT-based cursor displays to associate command FDs (cursor “hotspots”) with screen widgets.
- Upon cursor release for command hotspots, provide the call to the HCI Command Request generation function, passing the assigned FD.
- Provide special command menu and text entry “pop-up” capabilities (details to be provided)
- Provide capability to return CCP Command Responses to a message bar.
- Provide for converting, mapping, etc. all display data changes to the appropriate widget.

Online Data Bank Access Services Work Required

- Provide the application interface capability to dynamically retrieve Command information from the Online Data Bank

Inter-Application Communications Work Required

- Provide the location transparent mechanism for sending User Command requests and responses between the Command Thread nodes (HCI, CCP, Gateway)
- Provide the mechanism for command messages routing and authentication to support a specified TCID test set/flow zones configuration
- Provide the capability to execute User Commanding in both the operational and application development (standalone) configurations.

Application Messaging Work Required

- Provide the application interface (to the System Message Writer) to support Command Application generation of text advisory messages

Application Data Logging Work Required

Provide the application interface to the System Logging Service for Command Application data, including

- the capability that allows applications to write messages to a workstation log
- the capability to create a local log to store logged data

CSCI Assessment

Function Name	CSCI Labor (EP)	% of CSCI	Function Labor Months
Application Services CSCs			24 LM

Lines of Code

To be provided.

Documentation

To be provided

Assumptions

None

Open Issues

- A “uniform” messaging service should be available for both HCI-CCP and CCP-Gateway Command Inter-Application Communications

- Whether the User Commanding HCI support can associate Measurement FDs’ states with Command Stimulas depends upon Online Data Bank Access to the definition of such relationships - need to clarify Data Bank content and implications on Cursor Commanding Concepts.

- Routing Authentication across User Commanding platforms may require enhancement to Application Services/System Services, as well as possibly TCID Build and/or System Control (OPS CM) (Post-Redstone)

2.5 System Services CSCI Assessment

Network Services Work Required

Network Services (Reliable Messages), will provide the system support required by Applications Services for User Commanding communications between the HCI-CCP and CCP-Gateway platforms.

System Message Services Work Required

System Message Services will provide the system support required by Applications Services for User Commanding to send text advisory messages

Data Logging/Delog Work Required

- Data Logging will provide the system support required by Applications Services for User Commanding to log command-specific data
- Data Delog will provide the system support and delog system viewer capability to retrieve and view logged command data from the local workstation log or from a remote workstation log

CSCI Assessment

Function Name	CSCI Labor (EP)	% of CSCI	Function Labor Months
System Service CSCs			12 LM

Lines of Code

To be provided.

Documentation

To be provided

Assumptions

None

Open Issues

None

2.6 TCID Build & Control CSCI

TCID Build & Control Work Required

User Commanding requires TCID Build and Control tables generation for the GSE Support configuration, including Gateway tables and Online Data Bank command definitions .

CSCI Assessment

Detailed requirements and CSCI assessment for the TCID Build and Control support for the User Commanding Phase 1 Thread is provided in the Test Build, Load & Activation Phase 1 Thread.

2.7 System Control CSCI

Operational Configuration Management Work Required

OPS CM software and tables load and activation services are required

- to load and initialize Command Service applications and supporting services on the HCI, CCP, and Gateway platforms
- to provide an API to a table of TCID descriptive qualifiers
- to provide TCID products, including command products, on the HCI, CCP, and Gateway platforms.

CSCI Assessment

Detailed requirements and CSCI assessment for the Ops CM support for the User Commanding Phase 1 Thread is provided in the System Build & Load Phase 1 Thread.

Open Issues

Enhancement to the OPS CM "Activity Manager" functionality to support command messages routing/authentication **may** be required (post-Redstone).

2.8 System Viewers CSCI Assessment

System Viewers Work Required

- Provide System Messages Viewer

CSCI Assessment

Detailed requirements and CSCI assessment for the System Messages Viewer support for the User Commanding Phase 1 Thread is provided in the User Display Monitor and Plotting Thread.

3. COTS Products Dependencies

3.1 SW Products Dependency List

DDVT Tool Selection.

3.2 HW Products Dependency List

Target HCI, CCP, DDP, and GSE Gateway Platforms.